Knowledge arrangements that make a difference

WAGENINGEN UR

For quality of life

Knowledge arrangements that make a difference

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Foreword

A couple of years ago the agri-policy supporting research programme 'Knowledge' (BO-09) launched the idea of *knowledge arrangements* as a way to describe and analyse what was about to happen in the knowledge co-operation between research, education, citizens, business and policy in the Dutch agri-food sector. Promising examples emerged with regard to new ideas about how knowledge processes could be designed and executed. For quite some time the labour division between researchers, extension workers, educators, government and entrepreneurs in the agricultural sector was clear and accepted by all parties. Farmers were educated and trained by education and supported in their daily business by extension workers. New scientific and technological knowledge was created and developed by researchers who disseminated their knowledge products to extension and education. In that way a linear knowledge chain was established, strongly supported by government.

Times have changed. For various reasons the strict linear knowledge approach no longer is adequate for the present knowledge-intensive agricultural sector. Trials with new alternative ways are being conducted: farmers learn from farmers, demand-driven research networks, students and teachers collaborate with researchers in knowledge projects, researchers become more market-oriented, etc. These changes demand new competencies, other research funding, adjusted procedures and rules. Or to put it another way, the capacity of the knowledge system needs adaptation.

Knowledge arrangement is a concept that covers these new ideas about knowledge processes and it provides a way to thematise the elements of capacities to be developed within the agri-knowledge system. The ideas this essay is built upon, originate from the policy supporting research programme BO-09/Knowledge commissioned by the Ministry of Economic Affairs, Agriculture & Innovation. This publication fits into a series released by the research programme about new knowledge configurations in the sector of agriculture, living environment and food. The aim of the research outcomes of BO-09 are always to gain better understanding of the function of knowledge in the agri-sector and to provide people that are involved in knowledge processes with insights, approaches and tools for adequate operations.

One such approach can be to offer a toolkit for knowledge professionals to support them in improving their expertise. We are confident that the point of view which is taken in this essay, capacity development, can serve as a bedrock for further developing a collection of tools that can be arranged into a toolkit for knowledge workers. In so far, this essay is an addendum to '*Critical success factors in capacity development support*' (Wigboldus, 2011). Wigboldus' paper and this essay basically use a similar view on capacity development.

To gain from the experiences of the readers of this essay we would like to invite them to share their remarks with the BO-09-programme team.

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Summary

New developments in public knowledge systems ask for adapted capacities of individuals, organisations and networks involved in knowledge processes. This essay describes views, insights and concepts with regard to some of these developments. Based on research and experiences from the past five years in the policy supported research cluster 'Knowledge' (BO-09) we elaborate on the concept of *knowledge arrangement* to shed light on capacities to be developed. In addition we connect our views with experiences concerning capacity development in international projects.

Research and education are considered as subsystems of a public knowledge system, both with their specific function. The demarcation line between these subsystems however is blurring. Education is exploring the field of practical research in close collaboration with business and other organisations, while research is developing sensible antennas for societal impact of knowledge. There is a growing number of situations where research and education join their effort for providing answers to societal questions. At the same time there is also a growing awareness that creating and developing knowledge is not reserved to research and education alone. On the contrary, citizens, business and other societal organisations possess valuable experience and expertise which often is a *conditio sine qua non* for a successful trajectory of developing new knowledge and finding relevant answers. We call the joint venture of education, research and business or other societal organisations for creating or developing knowledge a *knowledge arrangement*.

In this essay a graphical model of knowledge arrangements is used as a hook to attach insights which we think are necessary for developing capacities of individuals, organisations and networks of organisations. The model depicts the dynamics of those knowledge configurations where various stakeholders, sometimes even with opposite interests, have to find ways to co-operate in a direction agreed upon. The graphical model has two additional layers. A deeper layer that explains the uncertainties of situations where knowledge arrangements are at work. These situations are described using the so called Cynefin framework developed by David Snowden. An upper layer based on work of Simons points at levers for controlling knowledge arrangements and

monitoring and evaluating them. Despite the awareness of uncertainties and risks when starting a knowledge arrangement, appropriate methods of guiding an arrangement and learning from experiences should be part of the capacities of people and organisations who have a stake in the knowledge configuration.

The perspective of capacity development we use in this essay is from the inside of knowledge arrangements. By this we mean that our position is not that of experts from the outside prescribing participants in arrangements what to do. Capacity building is in our view, part of the endogenous dynamics of knowledge arrangements: it is a reflexive process. Each party in an arrangement, from research or business or government or education, is obliged to critically reflect on his function and on the broader context of societal developments. The concepts that are offered in this writing are meant to support these reflexive considerations. The graphical model with its upper and deeper layers can be used as a *lingua franca* for those who want to reflect on their position in a knowledge arrangement.

International experiences with knowledge projects have resulted in a so called 7C approach. We combine this approach with our model of knowledge arrangements and add three developments that have proven to be essential in national knowledge projects: the individual as networker, the organisations as learning organisation and the network of organisations as communities of practice.

This essay is not a collection of recipes to be followed strictly by beginners. It is written for mature participants in knowledge arrangements who already have some experience in working with diverse stakeholders and who recognise different levels in societal developments. The concepts we introduce in relation to arrangements are treated briefly but each time linked to the central graphical model. Readers are invited to further search for knowledge if they get interested. That will stimulate the dynamics in knowledge arrangements.

Introduction

The Dutch Agri-food Knowledge System is renowned for its ability to support and stimulate a green sector that is competitive and sustainable. In the sector as well as in the knowledge system a lot of changes are occurring which demand for reorientation of the capacities needed. In this essay a new phenomenon in the knowledge system, the 'knowledge arrangement', will be considered as exemplary to explain the changes and its consequences for capacity development.

Regional produce
Centrally located in the country is the 'Geldersche Vallei'. Although near to cities like Utrecht and Amsterdam, this region is characterised as rural in the Dutch context. Farming, leisure and nature are basic elements that all demand full attention of inhabitants, researchers and authorities. A regional *workshop* (werkplaats) has been founded with financial help of municipalities. This workshop is linked to the programme Regional Transition by the Green Knowledge Co-operative (GKC) and acts as a centre from which energy and knowledge are being spread over the region. The energy now is focused on making citizens aware of the importance of regional produce for sustainable agriculture. Students in collaboration with researchers, farmers and leisure organisations conduct research for quality and marketing of fresh or preserved food from the region. The aim is to connect regional ability of agricultural production with growing need of city-dwellers for healthy indulgence, speciality and premium products.
Info: http://www.dewerkplaats.eu/index.php/gelderse-vallei-en-eemland/347-kenniswerkplaats-krijgt-voet-aan-de-grond-in-gelderse-vallei-en-eemland

Research, extension and education, for a long time, have been functioning as subsystems in the Dutch Agri-food Knowledge System and together with their mutual connections they have built a solid knowledge infrastructure. All three subsystems had their own specific developments during the past decade, typified however by joint characteristics. Extension was privatised, in education an increase in scale could be observed and research became much more demand-driven. These developments have in common that the emphasis has moved from collective approaches towards allocation of resources and activities based on market forces. Organisations in the public knowledge

domain still receive their funding mainly from public sources, but government acts at a distance and markets and pseudo-markets determine the direction of activities. Market-driven and result-oriented have become leading principles in the Agri-food Knowledge System. For all parties faced with these developments, it means a change in thinking, viewing and acting. The success of a knowledge system working under these new conditions is determined by the capacity of the actors to cope with these leading principles. It asks for competent participants, adequate facilities and sufficient resources.

In this essay we describe a perspective from which we want to explain the behaviour of the changing knowledge system. This perspective is linked to what we call *knowledge arrangements*.[1] We use the word arrangement for an entity that is composed of various ordered parts. It is a phenomenon that can be observed as different objects arranged like a bouquet of flowers. It is also a settlement, an agreement of the form in which the objects are arranged. The word knowledge arrangement is used in this essay as a concept to imagine the collaboration of various actors in the knowledge system, each with their own expertise and organisational backdrop. It includes researchers, educators, workers in governmental bodies, entrepreneurs, etc. Not merely as individuals possessing specific competencies, but also as representatives of organisational competence. An arrangement as we consider it, displays views on how knowledge processes function in the present so called knowledge economy. In a knowledge arrangement, the processes of knowledge creation, dissemination and utilisation are not modelled like a string of beads, but as bunch of flowers. Sometimes as a neatly arranged posy, in other cases as a bouquet of wild flowers. Tangible and intangible elements of an arrangement represent different types of knowledge. Some tacit knowledge is embrained in experts that take part in an arrangement, or it is embodied in field workers who are asked to carry out some actions. Explicit codified knowledge can be entered into an arrangement by way of reports or protocols, and embedded knowledge can be available in devices and laboratory equipment. In essence a

[1] Geerling-Eiff, F.A., Kupper, H.A.E. Beuze, M. de & Wals, A.E.J. (2007). Een steen in het water (1.0). Een handreiking voor het werken met kennisarrangementen. Wageningen: Wageningen UR (University & Research centre).

knowledge arrangement is an ordered collection of knowledge types combined in a way to let new knowledge grow and flourish.

Rural network
In rural areas where agriculture for a long time was the main economic activity, ecology, landscape and agriculture at present co-exist tensely. Profit margins for farmers are under pressure, family holdings disappear and remaining farmers up-scale their activities to improve cost-effectiveness. Ecologists plead for precipitation in acknowledging the European Natura 2000 areas. Landscape professionals and citizens want to keep off large stables from rural landscape. Despite tensions, all rural stakeholders have to find ways out and they cannot escape each other's claim for sustainable solutions. The challenges are complicated. There is a demand for developing new knowledge and connecting existing knowledge.
In a growing number of rural areas workshops spring off from initiatives of regional or local actors to find ways to co-operate. This can start with moderate knowledge projects connecting a couple of farmers, students and researchers to a common venture. If a workshop succeeds and starts to grow then a coherent group of projects can be conducted, logically sequenced in time. Workshops that are settled gradually get names like Regional Workshop, Knowledge Gate or Regional Innovation Centre. Challenges can vary from reconstructing arable land, soil fall control, managing ground water levels, or stimulating economic development. In some regions co-operation is shaped as separate ad-hoc knowledge projects, while other regions settle their activities as regional agreements or knowledge agenda's. Main funding often is provided by regional administration and co-financed by other organisations.
Info: http://www.netwerkplatteland.nl/index.php?option=com_content&view=article&id=789&Itemid=65

A knowledge arrangement unfolds as collaboration between different parties based on some agreement on how to organise jointly conducted knowledge processes. It includes people, facilities, financial sources, commitments, terms and rules. Such a setting often appears as a knowledge programme, a knowledge project or a group of knowledge projects. It leaves behind the idea that only a specific group of knowledge workers create new knowledge which is

transferred to those who are interested, mostly anonymous to the knowledge workers. It takes on the contrary as starting point, the convincement that in modern knowledge societies well-educated people from different parties are able to contribute to all distinct knowledge processes. We have observed that these abilities of individuals and organisations are nowadays at hand in the Dutch green sector, but that the capacity to collaborate in a synergetic way needs further development.

The main focus of this essay is on capacities necessary for the success of knowledge arrangements and on how to develop those capacities. Our position is not that of an external expert outside such an arrangement, prescribing others what to do. We prefer to write our narrative as if we exist inside a knowledge arrangement as yeast inside dough to let it rise. Our stance is being part of the endogenous dynamics of a knowledge arrangement.

In the first section we start with a brief description of what is changing in the current public Agri-food Knowledge System in the Netherlands. Then we introduce an eclectic dynamic model which supports insights into some of the new configurations and processes in the system. Subsequently we will shed light on the required capacities of the knowledge system and how these can be developed. We use critical success factors to construe which elements, in our opinion, need reinforcement in capacity development.

The experiences from the BO-09 research programme originate predominantly from Dutch situations. An important part of the expertise of the Dutch Agri Knowledge System however is 'exported' and used in international settings. Researchers and educators are actively involved in many projects in diverse fields. The ministry of Economic Affairs, Agriculture and Innovation (EL&I) has commissioned the Wageningen UR Centre for Development Innovation (CDI) to make a comprehensive report about insights, concepts and experiences concerning capacity development in international projects. The basic view BO-09 has used to consider knowledge projects and the perspective from which CDI looks at capacity development show a striking similarity. Combining the national and the international views seemed a challenge very worthwhile to

accept. In this essay we have taken from the companion publication issued by the Centre for Development Innovation[2] the 7C approach. This approach has been further developed in this essay and translated to the situation of knowledge arrangements. In table 2 we show how the approach based on international experience can be deployed in situations of national setting. There we make additional use of capacities very much appreciated in The Netherlands: (a) the individual as networker in a knowledge arrangement, (b) the organisation as a learning organisation and (c) the network of organisations supporting communities of practice.

[2] Wigboldus, S., Lee, J. van der, Brouwer, H., Hijweege, W.L. (2011). *Critical success factors in capacity development support. An exploration in the context of international cooperation.* Wageningen: Wageningen UR.

Capacity changes in the Dutch Agri-food Knowledge System

The Dutch agri-food sector mainly consists of small and medium-sized enterprises (SMEs). There are however also large links, dominant in the production and supply chain, like dairy co-operatives, slaughter firms, flower auctions and supermarkets. It is generally presumed that the competitive edge of the Dutch agri-sector on world markets, can only be maintained by knowledge intensive production and trade. Large companies have resources available for creating and developing new knowledge. Smaller enterprises, especially family holdings, have to call upon the public knowledge system to get access to new knowledge. In the past decades public knowledge services were for free. Now that extension is privatised and research has become much more market-driven, SMEs are asked to financially contribute for the use of research outcomes. As a result of governmental policy, the public knowledge subsystems research and education now consider it as their common task to create, develop and disseminate knowledge jointly with their societal partners. Until a decade ago creation, developing and dissemination was predominantly looked at as a linear process. In former days, research was creating and developing, extension was responsible for dissemination, education transferred knowledge to young future entrepreneurs and business was merely using knowledge. Nowadays these knowledge processes are seen as collective activities of all stakeholders. This demands new capacities of all individuals and organisations involved. Researchers are asked to think market oriented and to explain the utility of their research efforts for further research, for business or for education. Schools are asked to not just educate students in regular initial courses, but in post-initial courses as well, for supporting lifelong learning. Teachers and students need to realise that much of current knowledge is available in business and research institutes. Co-creating of knowledge as a joint venture from enterprises, research and education gradually gets within the focus of all stakeholders. Firms that were hesitating or even inert to use new knowledge, now actively seek how knowledge can improve products and processes. Present views on public governance see government more at a distance, implying that public funding is only available for knowledge creation and development when properly articulated questions are at hand. Government emphasises that business, research and education should consider knowledge processes as a collective endeavour.

All parties involved in this new functioning of the knowledge system are supposed to adjust their expertise, skills and attitude to the changed context. Also allocation and use of resources needs adaptation. In brief, adequate capacity development is required for all participants in the Agri-food Knowledge System. Not merely directed towards optimisation of internal ways of working, but towards a reflexive vision on knowledge in the present society. In the complex Dutch agri-food sector, requiring innovation and sustainability, this is quite a challenge. Dealing with dilemma's when making the interrelationships between people, profit and planet sustainable, calls upon the capacity of business, research, education and government.

We have developed a model that can serve as a framework to elucidate viewing, thinking and acting concerning capacity development. Thinking means what one should keep in mind, viewing implies taking a valid perspective and acting means excellent operation.

Viewing
Societal questions are leading for research proposals. Outcomes of research projects and educational efforts are being judged against their contribution to solving societal needs. Research and education are held publicly accountable for their dedication to societal matters.

Thinking
Agri-food production takes place in the spotlight of public attention. Media provide listeners, readers and viewers with antagonising images of animal diseases, environmental problems, lack of animal welfare or unhealthy food. Answers to societal questions therefore need wide acceptance to be deployed successfully. The knowledge system has to be aware of critical monitoring and needs a rigorous market-orientation.

Acting
Partners in the knowledge system jointly should seek co-operation with stakeholders from business, government and other societal organisations. Configurations that consist of relevant representatives of organisations involved, act in projects to create, develop, disseminate and use knowledge.

The model we will present in the next chapter is applicable for knowledge projects, with people from different co-operating organisations, that are searching for acceptable answers to societal questions. We realise that fundamental scientific research and technology[3] may not fit in what we propose as knowledge arrangements. In those cases the relationship between knowledge creation and societal needs may not be obvious directly. In what follows we will restrict ourselves to knowledge that is suitable for situations in which it can be applied more or less directly.

[3] Kupper, H.A.E., Beuze, M. de, Geerling-Eiff, F.A., Lans, T. & Wals, A.E.J. (2007). *Het lezen van kennislandschappen in een groene beleidsomgeving*. Wageningen: Wageningen University & Research centre.

A model for knowledge arrangements

The model departs from societal questions. These can be issues like: optimise work processes in agri-business, balance expanding agricultural production and nature preservation, educate school children in eating healthy food, monitor animal welfare, improve agri-logistics, investigate space for flooding rivers, etc. Representatives of various organisations, collaborating in knowledge projects, are aiming at providing knowledge that can contribute to answering questions originating from societal needs. The context of these needs is shaped by opinions, meanings and considerations of citizens, consumers, producers, government, researchers, students and educators. Organisations that delegate members to a knowledge project assume to gain from their participation for the sake of their own benefit, or for the common benefit of participating organisations, or for society at large. To understand the dynamics of an inter-organisational knowledge project one should look at it from three perspectives: individual, organisational and network. Individuals establish the project or programme team and they act according to their professional and personal considerations in accordance with general guidelines from their organisations. The organisations are somehow committed to the expected outcomes of the project. Because organisations are stakeholders in the societal question that is being considered, also their mutual network relations are at stake. So the model distinguishes three levels of perspective: individual, organisation and network of organisations. Referring once again to the metaphor of a knowledge arrangement as a bouquet of flowers, the individuals with their expertise are the flowers. The stalk connects the individual flower with the nourishment like the individual person is connected to the knowledge of the participating organisation. Finally, the vase contains both flowers and water and makes the arrangement durable. Just as the network of organisations that is necessary for the long term success of a knowledge arrangement.

Inspiration for horticulture

Horticulture in greenhouses needs to become independent of fossil energy sources. Creative and ingenious ideas are necessary. An international contest was organised for the design of an energy-neutral glasshouse. More than forty contributions could be judged.

Three winners were allowed to build their design at the premises of the Innovation and Demo Centre. The Sun Energy Greenhouse is designed to exploit as many sunlight as possible. The Sun Shield Greenhouse uses solar cells to protect pot plants from dehydration. The Flow Deck Roof collects sun energy for heating water in summertime and stores it for wintertime. Innovative solutions will inspire professionals from practice to look for sustainable solutions in their own context.

Researchers, growers, engineers, technicians and inventors meet in an innovative knowledge arrangement and are accommodated with demo greenhouses to apply their ideas in practice.

Info: http://www.kasalsenergiebron.nl/

The diagram

How the project team will deal with the societal question will depend on how the question is understood, interpreted and explained and which kind of answer can best contribute to what stakeholders see as an adequate solution. Maybe the question is made very clear already and knowledge is available with regard to the question's domain; then the project team can collect, recombine and disseminate knowledge and people can learn how to use it. If so, well-known project approaches can be used and proper planning can be made. The knowledge configuration's capacity in that case, is accessing knowledge and support people to learn how to use it. The situation is completely different when a question is fuzzy and only intuitive directions of answers can be recognised. Stakeholders could incorrectly have the impression to talk about the same problem and even when they could clearly express common understanding, preferences and solutions could be miles away from each other. Just disseminating available knowledge will not solve anything. Agreement on interpreting the situation at hand is a pre-condition for seeking further solutions and their consequences for the distinct stakeholders. Such a knowledge project

cannot be executed according to a well-defined project plan. Stakeholders' capacity in the knowledge configuration mainly comprises the ability to clear up the situation and to gain acceptance for jointly seeking answers.

Greenport Venlo
In the South-Eastern part of The Netherlands horticulture (predominantly in greenhouses) is an important source of income. The area is in proximity of the Ruhrgebiet in Germany. Availability of Dutch fresh produce in German supermarkets can only be attained by superior logistics. An national approach, supported by national Administration, named 'Greenport' stimulates regional initiatives for innovative collaboration between regional government, growers and third party logistics. In the South-East region, part of such a Greenport is a knowledge agenda for 'fresh food & logistics' in which priorities for adequate education are written down. Vocational education in that region in collaboration with Wageningen University and Research Centre in close connection with the horticultural sector establishes a group of knowledge projects which are expected to result in a Regional Greenport Business School.
Info: http://www.citaverde.nl/nieuws/nieuwsarchief/samenwerking+in+een+regionaal+kennisarrangement+greenport+venlo?an=337

The basic issues of a knowledge project described above are graphically represented in figure 1. The context with its societal relevant question is central at the right-hand side. Organisations that have a stake in answering the question and that want to commit themselves to a shared solution are willing to start a knowledge project. They make members of their organisation and funds available to work in a project under more or less strict conditions. This is the input at the left-hand side. The project team develops a view on the societal context, so as to determine which values play a role and what kind of knowledge could contribute to make a difference. This interpretation of the societal context, in the right upper corner, is necessary to lay a foundation for the project's approach, the process in the middle. The final aim of the project is 'to make a difference', to cause impact in the societal context. That is to create and develop knowledge that can change opinions, behaviour, attitudes, meanings, conditions etc. No project, however, can be held responsible for that final aim, only for intermediate goals and targets. A project ought to deliver output. If individuals, organisations or networks of organisations are prepared

to use the output, then that achievement will be called the outcome. A successful outcome is as far as a project team can reach. Organisations that are involved in the societal question may have possibilities to let the outcome move into the very core of the societal question: the impact. As stakeholders take the initiative to start a knowledge project, they should feel responsible for making the project successful. Many factors will influence the success of the knowledge project, but some factors for success are more critical than others. They can apply to individuals, organisations or networks.

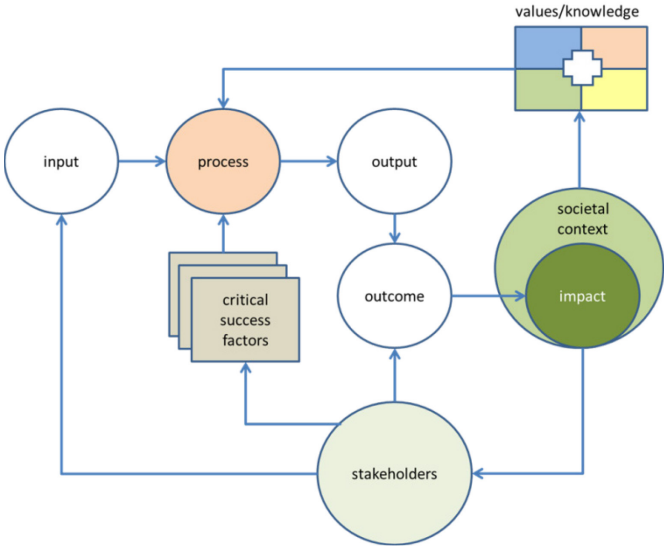

Figure 1. A model of knowledge arrangements.

In our model, we combine various concepts from different sources. Some of them are positioned in linear sequences while others are being used in feedback loops. In the sections to follow in this chapter, we will discuss the eclectic elements of the model and their relevance for the dynamics of knowledge configurations. Each element is discussed briefly. Further reading is recommended to gain a deeper understanding of a specific concept. It is the comprehensive approach of our model, in positioning the various concepts in the

space of knowledge arrangements, what we want to emphasise. If one feels more familiar with another concept that is similar to what we present, we would like to encourage the reader to follow his or her preferences. As long as all elements of the model are being used in a coherent way according to figure 1.

Output-outcome-impact

The image of splash and ripples can help understanding the essence of output, outcome and impact. A knowledge project is like a boulder dropped in a pond[4]. The first effect is a splash, the output. Then, the ripples spread out from the flash, the outcomes. The ripples are certainly caused by the splash of the stone thrown in the water. The outcome can be assigned to the efforts of the project. Gradually the ripples reach the boundaries of the pond and have their impact on the waterfront. The outcome can be controlled by the project, the impact[5] at the boundaries is almost unpredictable and out of control by the project team. The stakeholders however are committed to give as many opportunities to the ripples as possible to let them reach the borders of the pond. They can free the way to reinforce the impact. There is a feed forward effect from output to impact, but also a reinforcing feedback based on strong involvement of stakeholders in making the outcome successful.

Values and knowledge

One cannot expect beforehand that, even simple, societal questions with a limited number of stakeholders can be seen as single facetted phenomena. Let alone more complicated or complex situations in a societal context. Before a knowledge project can start, according to our model, a shared vision by the project team is necessary concerning the status of the problem and the implications for the approach of the project. We assume that the role knowledge can play in 'making a difference' for a societal question depends on the set of basic values of the distinct stakeholders. To cross-relate knowledge and values, in our model we make use of two axes, one for 'normative certainty' and another one for 'cognitive certainty'. If normative certainty is high then values in question are made clear and are shared amongst stakeholders.

[4] http://www.hc-sc.gc.ca/ahc-asc/alt_formats/pacrb-dgapcr/pdf/finance/contribution/splash-ricochet-eng.pdf

[5] http://www.idrc.ca/en/ev-9330-201-1-DO_TOPIC.html

Low certainty on values implies the opposite. High cognitive certainty points at knowledge available from comparable situations. If it is obvious that knowledge has to be created, recombined or further developed, that is called low cognitive certainty. Four intersections can be made between cognitive and normative certainty, each with its particular characteristics.

House of Food
North of Amsterdam is the cradle area for Dutch food industries like chocolate, biscuits, starch, edible oil. Not only for consumer products, but also for semi-finished products and raw materials. And for related industries like machineries, packaging, logistic devices etc. The food cluster in this area includes also service companies for advertising, design, finance. Ten percent of employment in the region stems from the food cluster which is highly innovative in production processes, export and food development and design.
A knowledge arrangement with partners from food producers, educational institutes, governmental agents, European Regional Development Fund, has established a framework for co-operation: the Innovation Studio. Six themes are selected to guide the activities: health, sustainability, authenticity, persuasion, new sources for food and 'silver food' (for the elderly). The overall objective is to build a House of Food with all relevant stakeholders, to innovate and improve the food sector in the region.
Info: http://www.houseoffood.nl/

In figure 2, the four cells are diagrammed. The combination of high cognitive and high normative certainty stands for a problem situation where there are shared values from stakeholders and the appropriate knowledge is present and accessible. Knowledge can be disseminated and people involved can easily learn how to use it. Such problem situations are called 'domesticated'. Quite the opposite is depicted as 'wild problems'. No clear answers can be given when knowledge is not available and when stakeholders' values diverge. When however knowledge is at hand and values are diverging, then knowledge arrangement should focus on achieving shared goals. On the other hand when a knowledge arrangement benefits from shared values and vision, but no appropriate knowledge is available, then the focus be better directed to finding

accepted solutions for the commonly experienced problem situation. According to our model, it is recommended to knowledge arrangements (programme or project teams), to probe the cognitive and normative aspects of a problem situation and of the stakeholders involved.

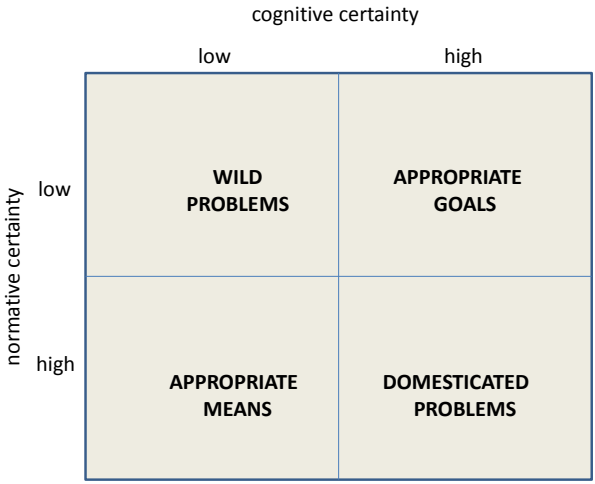

Figure 2. The problem pane.[6]

Colour thinking and learning

If a knowledge project team has interpreted the societal problem as predominantly in one of the four fields of the problem pane of figure 2, the next step is to decide which approach is suitable to tackle the situation and to accomplish a solution that really makes a difference. For explaining that part of the model we refer to 'colour thinking and learning', recommendations from Caluwé and Kessels.

[6] Wetenschappelijke Raad voor het Regeringsbeleid. (2006). *Lerende overheid, een pleidooi voor probleemgerichte politiek,* Den Haag: WRR.

Blueprint thinking is well-known. It comes down to rational thinking and more or less straightforward implementing of change. Project activities can be planned easily and the expected results can be defined properly. This approach suits with domesticated problems. Yellow print thinking means that different interest, execution of power and handling of conflicts come to the fore. If a project team can achieve a balance of power then the focus can be directed to finding available answers to the problem in question. The yellow print suits the pane with low normative certainty and high cognitive certainty. Redprint thinking is adequate when people share a common vision and agree on goals, but don't know how to find answers to their questions. A project team then should concentrate on creating and developing knowledge in co-research with the stakeholders. Finding appropriate means to solve the problems is the guiding principle in those situations. Whiteprint thinking recognises the complexity of situations and accepts that no right answers can be provided from the outside. All stakeholders alike are owner of the problem as well as the solution. It is their shared responsibility to learn their way out. If both cognitive and normative certainty is low then whiteprint approaches are suitable.

Thinking in the four different colours have in common that members of the project team in close collaboration with the stakeholders always are open to learning from all participants involved. This learning in action is called greenprint thinking. According to Kessels[7] the learning potential of the project team can be enhanced by including seven elements in the regular team activities.

- Subject matter expertise
  Team members, especially those from research and education, but from other organisations too, very often are asked to collaborate in the team because of their expertise in a certain discipline or from relevant experience. The project team should provide opportunities to improve the expertise so as to gain most from the common knowledge in the team.

[7] Kessels, J.W.M. (2001) Learning in organisations: a corporate curriculum for the knowledge economy. *Futures 33* pp 497–506.

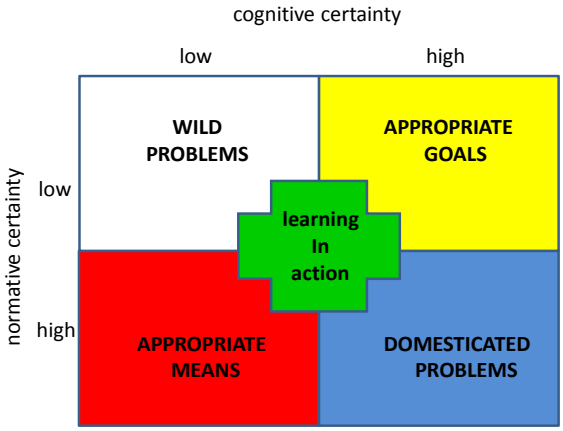

Figure 3. Colour thinking and value-knowledge characteristics.

- Problem solving
  Domain specific expertise is not a warrant for applying the knowledge adequately to solve real world problems. In domesticated problems it might be the case, in other situations however competencies are required on an excellent level. The team's learning activities should be directed towards development and improvement of problem solving skills.

- Reflective skills and meta-cognition
  Team members should evaluate the progress they are making in some fields and why they are lagging behind in others. Every team member should possess or develop the skill to reflect on his own cognitive capacity and on that from others.

- Communication skills
  Getting access to other professionals and to other networks relies heavily on the proficiency in communication and social skills. It is not only a matter of polite behaviour. The main question here is: how do I make myself attractive in order to participate in the network of interesting knowledge

workers? What can I offer and how am I accepted? Highly developed social and communication skills promote a favourable learning climate.

- Self-regulation of motivation and affection
  Team members and team leaders can effectively work in the project if they are motivated to make the common effort a success. Affective relationships within the team, doing each other a favour, will stimulate the cohesion of the team. Expressing the emotional and affective drives team members have, can regulate their endeavour and maintain their mission in the project.

- Peace and stability
  Project teams often suffer from hasting from one deadline to the other. Reflection an learning will impoverish and motivation will diminish. A project team that can promote peace and stability and build some slack in schedules will give time for reloading and generating creative brain waves.

- Creative turmoil
  Creative turmoil requires a certain amount of existential threat. It should really matter, to surmount or to lose. In a sense peace and stability, and creative turmoil are two contrasting learning functions. Some team members will do better in an environment that is reigned by peace and stability, others feel spurred by creative turmoil. Kessels considers both as necessary, but in a balanced way.

Critical success factors

We consider a critical success factor (CSF) as an attribute of a knowledge arrangement that must be in perfect order for the arrangement to be successful. Such a characteristic of a knowledge project is crucial for eventually achieving the aim of the project: the societal impact. As it is difficult for team members and team leaders to give full attention to a wide range of success factors, a limited set of those factors is selected to be given permanent attention. These factors are considered critical for success.

Based on previous research[8] we have found four groups of factors[9] that are crucial for knowledge arrangements:

- **Vision**. What is the view (vision, mission, strategy, beliefs and values) of stakeholders that can provide meaning to the activities to be carried out in the knowledge configuration?
- **Culture**. What is the actual behaviour, attitude and practice of team members or stakeholders?
- **Competencies**. Which skills, qualities, expertise and experience of people, organisations or networks become part of the arrangement?
- **Support**. What support can participants expect or what do they experience from organisations they represent or from other stakeholders?

These four CSFs for knowledge configurations are applicable on three levels[10] of participating members in knowledge configurations:

- **Individual**. The person as a member of the project team, or as a manager in one of the organisations involved.
- **Organisation**. An organisation that provides funds for the project, or delegates in a project team, or stimulates implementing outcomes of the project.
- **Network**. A group of organisations that maintain functional connections that are relevant for the societal problem at stake.

[8] Kupper, H.A.E., Lans, T. & Wals, A.E.J. (2007). Dynamisering van kennis uitgangspunten voor kennisarrangementen tussen onderwijs, onderzoek en bedrijfsleven. *Tijdschrift voor Hoger Onderwijs*.

[9] Kupper, H.A.E.; Lans, T.; Wals, A.E.J.; Geerling-Eiff, F.A. (2006). De akoestiek van kennisarrangementen Kenniscirculatie tussen onderzoek, onderwijs en ondernemingen. *Intellectueel Kapitaal* 5, 22-27.

[10] Rothaermel, F.T.& Hess, A.M. (2007). Building Dynamic Capabilities: Innovation Driven by Individual-, Firm-, and Network-Level Effects. Organization Science, 18 (6), 898–921.

Table 1. CSF's for knowledge configurations.

	Individual	**Organisation**	**Network**
Vision	The individual can make explicit the personal view on contributing to the intermediate and final aim.	The organisational strategy is in accordance with the objective of the knowledge configuration.	The network of organisations declares commitment to solving societal problem.
Culture	The individual is motivated and can adapt to changing circumstances.	The organisation is a learning company and is used to deal with knowledge creation and development.	The network is transparent in sharing experiences with multi-organisational teams.
Competence	The individual knows his strong and weak competencies and is prepared to further develop his competencies.	The organisation can explain participation in the knowledge configuration based on the organisation's core competence.	The network shows experience with exploiting the synergy of the core competence of participating organisations.
Support	The individual uses his subject matter expertise and social intelligence for the benefit of the knowledge configuration.	The organisation offers sufficient facilities and a high echelon promoter for covering its representatives.	The network is prepared to coordinate implementation of the outcome of the knowledge project.

So far we have explained the basic elements of our model for knowledge arrangements that are depicted in figure 1. There is however also a deeper layer below what is drawn in the diagram and an upper layer on top of it as well. For capacity development it makes sense to understand the model in a broader context: the deeper layer. And to deal with the consequences of applying the model for accountability and for monitoring and evaluating the processes: the upper layer. The deeper layer, which we find appropriate for capacity development, is described by the Cynefin model. For the upper layer we will introduce the theory of levers of control and combine that with monitoring and evaluation.

Cynefin

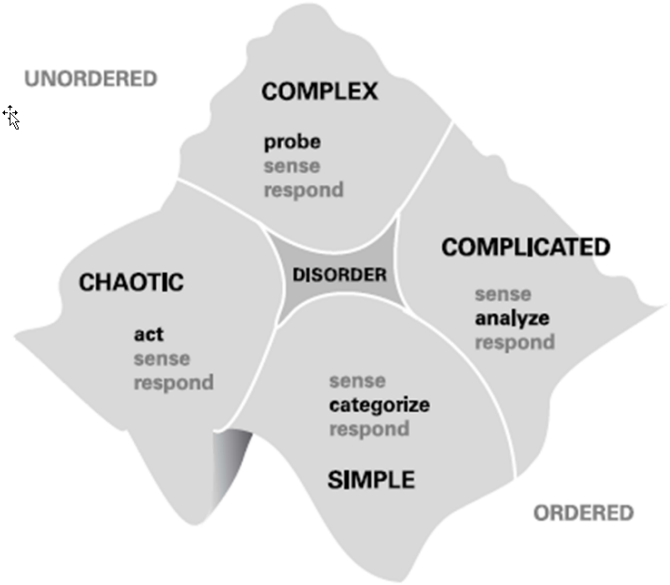

Figure 4. The Cynefin Framework.[11]

Situations where knowledge configurations are being applied are difficult to understand completely. There are multiple actors, with different interests, that are part of the problem and the solution as well. In many cases these interrelationships cause dynamics with multiple effects that cannot at all or even partly be predicted. In figure 1 this is depicted by using circular relations from the point of view of the stakeholders. They can be problem owner, or they commission the project, or promote or withhold the working of the project outcome, or they combine these positions. To better understand these

[11] Source: Snowden, D.J. & Boone, M.E. (2009).A Leader's Framework for Decision Making. Wise executives tailor their approach to fit the complexity of the circumstances they face. The Essential Guide to Leadership. *Harvard Business review*.

dynamics project teams can make use of the ideas of Dave Snowden. He developed the Cynefin[12] framework.

Snowden advises to use his view as a sense-making approach: what does a problem situation mean to a team member, a programme leader or another employee or manager of a participating organisation? Acting (taking particular decisions as a project team) makes sense if there is a shared understanding of the situation. Snowden's approach provides a common language to describe that. According to the Cynefin approach there are basically three systems in which problem situations appear: ordered systems (simple or complicated), complex systems and chaotic systems. In simple ordered systems there exists cause-effect relationships that are predictable and repeatable. Proper action, decision taking, follows the sequence: sense, categorise and respond. The phrase that is legitimate in this domain is 'best practice': once you have experienced what makes a solution successful, you can repeat it successfully the next time. In the complicated domain there too are cause-effect relationships but they are not self-evident like in simple situations. More expertise is needed to analyse the situation and the line to be followed therefore is: sense, analyse, respond. In the complicated domain there are different actions that are legitimate, so we better not speak of best practice but instead of 'good practice'. Project teams should not focus solely on one solution or approach, but leave space for diverse ideas or approaches. In complex situations cause-effect relationships are only obvious in hindsight, with unpredictable and emergent outcomes. Multiple agents (stakeholders) continuously modify the system. The line of decision taking here is: probe, sense, respond. Successful actions have to be amplified, failure must be dampened. Outcomes are new and the approach is 'emergent practice'. Mature and experienced project teams can have the expertise and experience to cope with these situations. In knowledge configurations, most situations are complex and it is quite a challenge for project teams and stakeholders to deal with that adequately. Chaotic systems have no cause-effect relationship that we can determine. Decision making is based on acting first to stabilise the situation

[12] http://www.youtube.com/watch?v=N7oz366X0-8

and then sense and respond. Any practice will be completely new. Snowden speaks of 'novel practice'.

Dairy Farmers Academy
Soil-bound dairy farming near areas of European regulated 'Natura 2000' areas demands limited emission of ammonia. Many farmers assume government to take measures and they hesitate to actively seek instruments for ammonia reduction. A knowledge arrangement of dairy farmers, animal science researchers and vocational students, called 'Dairy Farm Academy' (DFA), try to tackle the emission problems before European regulations will restrict milk production. DFA organises various events where farmers learn from farmers, e.g. Farmer on Tour and Dairy Café. Knowledge brokers (farmers having experience with the challenges of farming nature-sensitive areas) determine the agenda and select issues to be studied. Three topics are emphasised for ammonia reduction: (1) the floor of a livestock facility and gas emission from the barn floor manure, (2) acid treatment, (3) farm management software Specific Ammonia Excretion.
By exchanging knowledge about tools for ammonia reduction, farmers can anticipate on regulations specific for their context. From a growing number of working solutions it may be expected that necessary innovations need not always be expensive.
Info: http://www.melkveeacademie.nl/sitenieuws/verkenningstocht-naar-de-mogelijkheden-van-ammoniakreductie

Snowden's message is that depending on the space you are in you should act differently, there is no such thing as 'one size fits all'. There is one domain left: disorder. Meaning that you do not know which space you are in. And that is what knowledge configurations encounter most of the times. People like to consider situations from the perspective they feel comfortable with. Bureaucrats see problems as a failure of process. Experts want more time and resources to do proper analyses, politicians like to get lots of different people from lots of different background hoping to get a right answer. In chaotic situations leaders like to take immediate action and gather people in a command-control structure.

A key aspect of the Cynefin framework is the boundary between simple and chaotic situations. In simple situations past success makes people think they are invulnerable for future failure. Falling over the edge between simple and chaotic means complete crisis; recovery then is very expensive.
In figure 3 we have described the normative and cognitive characteristics of a situation where a knowledge arrangement might operate. The Cynefin framework adds some deeper laying and more general aspects of situations where knowledge arrangements are at work. The distinction between best, good, novel and emergent practices can be helpful when transferring experiences from one situation to the other.

Levers of control

The Cynefin framework might suggest that it is almost impossible to find out what situation a knowledge configuration is in and that actually no planning of activities can be made beforehand. A project leader will not encounter any sympathy from funding stakeholders when confronting them with all his uncertainties. Contracting commissioners require some guarantees for expenses to result in desired effects. As we have explained in the outcome-impact section, a project team cannot be held responsible for the final impact but only for an adequate transition from output to outcome. The question of guarantees for impact should be reframed in finding factors that enhance a successful transition from output, via outcome to impact. A leader could need 'levers of control' to help him diagnosing the progress towards final success. In this section we present what we call the upper layer of our model for knowledge arrangements. It deals with conditions that scaffold an arrangement and support it to achieve desired outcomes and eventually impact that matters. Simons[13] distinguishes four levers of control[14] that are in our opinion appropriate for knowledge configurations: (1) beliefs, (2) boundaries, (3) diagnostic controls and (4) interactive controls. It summarises in a sense the basic elements of the model we have presented so far.

[13] Tero-Seppo Tuomela (2005) The interplay of different levers of control: A case study of introducing a new performance measurement system. *Management Accounting Research* 16, 293–320

[14] Simons, R., (1995). Levers of Control: How Managers Use Innovative Control Systems to Drive Strategic Renewal. Harvard Business School Press.

- The primary purpose of beliefs is to inspire and guide search and discovery in project teams. When problems arise, beliefs help participants to determine the type of problems to tackle and the solutions to search. Beliefs motivate project members to search for new ways of creating values for impact. It helps to articulate the mission of the project team that addresses the values of the participants. Beliefs allow individuals to appreciate how they can contribute to the achievement of the mission.
- Beliefs motivate individuals to seek within an unlimited opportunity space. Boundaries communicate the acceptable domain for search activities and thereby demarcate the opportunity domain as a subset of the opportunity space within which the project members and stakeholders can exercise their energy. Beliefs and boundaries transform unbounded opportunities into a focused domain that participants are encouraged to explore and exploit.
- If societal questions can be characterised as domesticated problems, simple in their nature and blueprint approach is appropriate, then diagnostic control is suitable. After all in those situations goals are predetermined and output can be measured against some standard. If necessary corrective actions can be taken that influence processes significantly. The benefit of diagnostic control is that the project leader can delegate the control to his financial and quality staff members (budgets are the most widely used form of diagnostic controls). Diagnostic control provides assurance that the regular day-to-day activities are functioning well and that intended goals are being achieved. Through diagnostic control success factors are communicated and monitored.
- Next to diagnostic control Simons proposes to use interactive control to stimulate dialogue about uncertainties. As we have concluded from Snowden and his Cynefin framework in knowledge configurations the situations are mostly complicated or complex and cause-effect relationships are uncertain or even unknown. Dialogue in interaction between team members and stakeholders will focus on the meaning of signals from the societal problem. Interactive control is intended to promote dialogue and information sharing among a broad group of participants. It is designed to be important for all participants.

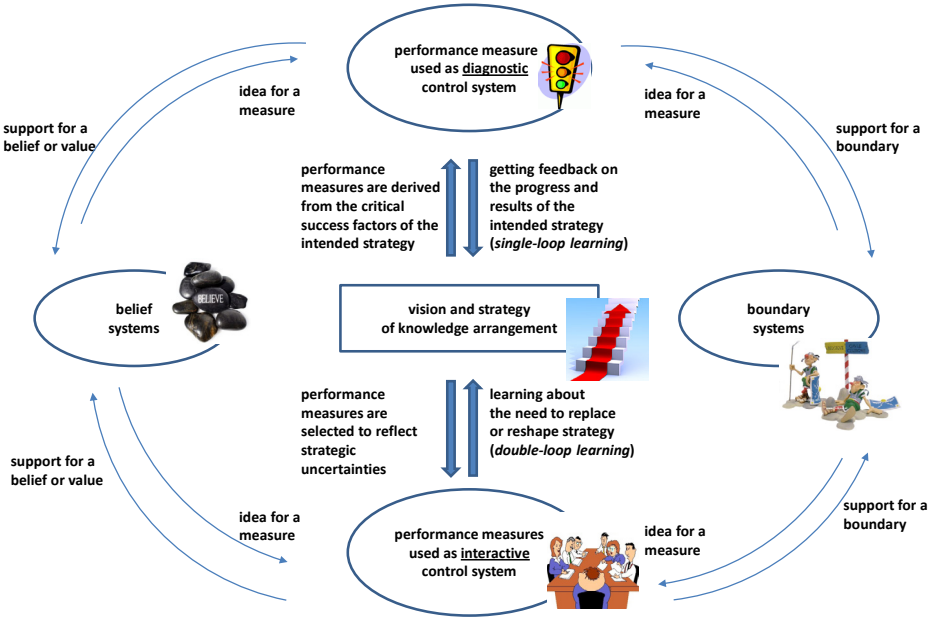

Figure 5. Strategic project controls, reciprocal influence.[15]

While beliefs and interactive control are used to encourage innovative behaviour, boundaries and diagnostic control are used to ascertain that people behave according to pre-established rules and plans[16].

The distinguishing advantage of interactive control is its support for double-loop learning. In other words, interactive control can assist in identifying emerging strategies and it can lead to the reformation of the existing modes of control. At the same time as project strategy is altered, the existence of prevailing

[15] Based on Tero-Seppo Tuomela (2005) The interplay of different levers of control: A case study of introducing a new performance measurement system. *Management Accounting Research* 16, 293–320.

[16] Widener, S.K. (2007) An empirical analysis of the levers of control framework. *Accounting, Organizations and Society* 32. 757–788.

beliefs and boundaries are also questioned. Interactive debate that stems from strategic performance could, in fact, reshape the strategy, and hence, also induce change in *all* the four levers of control (Tuomela, 2005; see footnote 14). Interactive control is used to promote and provoke discussion and the emphasis is on double loop learning, while diagnostic control is concerned with single loop learning.

Performance

For success it is not enough only to monitor the factors that are critical for the performance of the project. What we additionally need is indicators that a knowledge configuration performs according to the aim of what funding stakeholders want to achieve. We will need performance measures accepted by the stakeholders, that can be evaluated and provide evidence that objectives are attained and can be attained in the future (sustainability). In one of the first sections we have introduced three perspectives: viewing, thinking, acting. For knowledge configurations this means that societal questions are leading (viewing) and that effective solutions need broad acceptance (thinking). Eventually achievements ensue from acting. To consider the achievements we use a balanced scorecard approach that suggests that we should look at results in four domains represented by four main questions:

- Objectives: are we aiming at the stakeholders' goals?
- Target group: are our results appreciated by the target group?
- Internal processes: are we able to execute our processes in an excellent way?
- Learning and innovation: are we improving our learning and innovation ability?

There is a logical coherence between these four areas. Starting off from vision and approach (viewing and thinking) the main achievement obviously is the overall objective of the stakeholders providing the resources for the project. The results are only durable if accepted and appreciated by the target group. The project team only deserves appreciation if it did an excellent job. To be successful in following project activities the team must show a learning attitude and a drive to innovate.

Monitoring and evaluation

As we have described in this essay, people involved in knowledge configurations need the capacity to view, think and act adequately. A tailpiece that binds these three is the capacity to monitor and evaluate (M&E). We consider figure 1 as a diagram of a closed model. What we remark about capacity counts for all parties. All relevant stakeholders are included within the boundaries of our model. Monitoring and evaluation is a responsibility of all stakeholders involved.

Monitoring is the process of collecting information routinely, systematically and continuously against a plan, and sometimes against targets. The information might be about activities, or services, users, or outside factors affecting the organisation or project. This information will not in itself explain progress or lack of progress. Evaluation is an in-depth study, taking place at specific points in the life of an organisation, project or programme. *'Evaluation aims to answer agreed questions and to make a judgement against specific criteria. Like other research, for a good evaluation, data must be collected and analysed systematically, and its interpretation considered carefully. Assessing 'value' - or the worth or merit of something - and then taking action makes evaluation distinctive.'* [17]

Monitoring is the continuous process of examining the delivery of programme outputs to intended beneficiaries, which is carried out during the execution of a programme with the intention of immediately correcting any deviation from operational objectives. Evaluation, on the other hand, is carried out at a discrete point in time, and consists of an in-depth study. Monitoring often generates data which can be used in evaluations[18].

We see M&E as having four distinct functions:

- Accountability. There is a drive by funding stakeholders to require clear measurable indicators that are representative for efficacy, effectiveness and

[17] Ellis, J. & Gregory, T. (2008). Accountability and learning: developing monitoring and evaluation in the third sector. London: Charities Evaluation Services.

[18] http://www.evaluation.org.uk/resources/glossary.aspx

efficiency. Evaluation provides interpreted data for stakeholders who are held accountable by themselves or by others to use resources where they are intended for.

- Guidance. Monitoring and evaluation for those who are in the driver's seat can be utilised to determine if actions undertaken by stakeholders or project team let the solution to the societal problem shift in the desired direction.
- Appreciation. Evaluation displays where the project is so far. It can be used to express appreciation for the effort that has been put in by those involved. Appreciation can motivate people to further collaborate to achieve the final aim.
- Learning. If you want to learn you need feedback. M&E can accommodate stakeholders with information that can be used for reflection and learning[19].

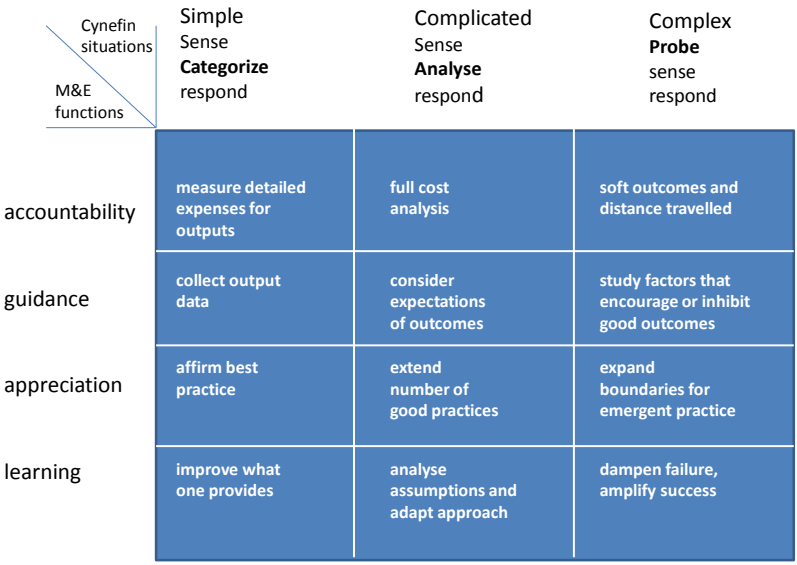

Figure 6. How to execute M&E in different situations according to Cynefin framework.

[19] Regeer, B.J., Hoes, A-C., Amstel-van Saane, M. van, Caron-Flinterman, F.F. & Bunders, J.F.G. (2009). Six Guiding Principles for Evaluating Mode-2 Strategies for Sustainable Development. *American Journal of Evaluation* 30, 515-536.

Capacity development

In this essay we consider it as our main task to shed light on different aspects of knowledge arrangements and on the capacities that should be developed for this venture to be appreciated by society. In the companion publication[20] to this monograph, Wigboldus (2011) introduces the so called 7C model for capacity development. In this chapter we will connect the described aspects of knowledge arrangements with the seven Cs.

The 7C model

Analysing several cases of capacity development has led to define seven core factors that breed success in capacity development.

1. **C**larify the overall Approach:
   Ensure clarity about the type of setting in which the project will take place (including historical considerations) and what capacity development will in concrete terms comprise of.
2. **C**omprehend the Context specifics:
   Ensure appropriate connection to on-the-ground realities by establishing sufficient understanding about relevant (regional) conditions for capacity development.
3. **C**ultivate Commitment:
   Establishing appropriate ownership and endogenous drive towards the aspired future. Ensure appropriate motivation and positive energy of those who need to turn things towards a sustainable development result. Establishing a clear sense of urgency.
4. **C**ustomise the envisaged Contribution:
   Tailor-make intervention in tune with specific setting imperatives. Position intervention for capacity development strategically in view of existing capacity dimensions, the ongoing capacity development dynamics, and the specific context.
5. **C**ause kept Clear:
   Keep track of change as it really happens (or not) to provide strategic guidance. Ensure staying appropriately informed about change processes in

[20] Wigboldus, S. (2011). *Critical success factors in processes of support to capacity development An exploration in the context of international development related projects.* Wageningen: CDI

view of principles of good practice as well as set objectives, feeding this back to management decision making.

6. **C**onnect to Complexity:
   Be ready to deal with complications flowing out of complex dynamics and allow for flexibility and appropriate adaptive management. Ensure appropriate and adaptive management as well as ensuring conditions that allow for flexibility. Regularly revisit assumptions about how change is expected to happen.
7. **C**reate support Competency:
   Activate other success factors by creating competent and capable team efforts. Ensure working with teams that have the right set of competences and capacities available in view of specifics/dynamics of the situation in which a commissioner intends to make a contribution.

In our opinion, essential in knowledge arrangements is the multi-level perspective. Individuals take part in teams because of their expertise and knowledge of the particular situation. They are however also representatives of organisations that act as stakeholders in the context of the specific situation. On their turn organisations function in a wider context of organisational networks. The knowledge that is being configured in a knowledge arrangement depends upon the involvement of all levels. This implies that the need for capacity development reaches from individual via organisations to networks. We have emphasised that in knowledge arrangements we deal with mature participants. Capacity development in such cases in our view is part of the endogenous dynamics. It is a shared responsibility of all actors involved. In table 2 we have expressed what the seven core factors can mean for the three levels in a knowledge arrangement.
On the individual level we make use of outcomes of a 2009 conference in Leiden, The Netherlands 'Towards Knowledge Democracy. Consequences for Science, Politics and Media.'[21,22] A competence profile has been developed for transition professionals. It is agreed by various participants of knowledge

[21] Transforum (2009). *De kunst van het samenwerken.* Zoetermeer: Transforum.
[22] Andringa, J. & Weterings, R. (2008). *Competentieprofiel van Transitieprofessionals*. Utrecht: Competentiecentrum Transities.

arrangements that the general competencies mentioned in a list for network managers is suitable for individuals in knowledge arrangements:

- Integral thinking; to integrate views from different scientific angles, disciplines and societal backgrounds.
- Analytic ability; to formulate a societal assignment out of a complex of circumstances and antagonistic interests.
- Ability to change; to alter opinions and attitudes of others and settle agreements.
- Mobilising ability; to guide and direct group dynamics and establish and maintain co-operation.
- Second order learning; to argue current ways of thinking and interpreting.
- Ability to reflect; to reflect on own and other's experiences for deploying new ideas.

Table 2. A multi-level interpretation of the 7C model.

	individual	organization	network
clarify approach	integral thinking	multi disciplinarity	introduce collaborative thinking
comprehend context	analytic thinking	personal mastery	provide shared context
cultivate commitment	mobilizing	shared vision	connect people
customize contribution	reflectivity	team learning	capture and diffuse new knowledge
cause kept clear	second order learning	mental models	stimulate learning
connect to complexity	change agency	systems thinking	enable dialogue
create competence	↑ networker	↑ learning organization	↑ community of practice

The organisational level is inspired by concepts of the learning organisation[23]. Senge distinguishes five disciplines, adequate to construct the core competence of organisations participating in knowledge arrangements.

- Personal mastery; is a discipline of continually clarifying and deepening our personal vision, of focusing our energies, of developing patience, and of seeing reality objectively.
- Mental models; are deeply ingrained assumptions, generalisations, or even pictures of images that influence how we understand the world and how we take action.
- Building shared vision; is the practice of unearthing shared pictures of the future that foster genuine commitment and enrolment rather than compliance.
- Team learning starts with dialogue, the capacity of members of a team to suspend assumptions and enter into genuine thinking together.
- Systems thinking is the Fifth Discipline that integrates the other four. Systems thinking also needs the disciplines of building shared vision, mental models, team learning, and personal mastery to realise its potential. Building shared vision fosters a commitment to the long term. Mental models focus on the openness needed to unearth shortcomings in our present ways of seeing the world. Team learning develops the skills of groups of people to look for the larger picture beyond individual perspectives. And personal mastery fosters the personal motivation to continually learn how our actions affect our world[24].
- Because of an organisation supporting its representatives in a knowledge arrangement with diverse disciplines we have added multi-disciplinarity as an organisational competency.

On the network level we refer to the concepts of communities of practice (CoP). According to the design guide for CoP's, these communities possess a number of characteristics that make them very appropriate for co-operating

[23] Senge, P., (1990). The Fifth Discipline. The Art and Practice of the Learning Organization. New York: Currency Doubleday

[24] http://en.wikipedia.org/wiki/The_Fifth_Discipline

organisations in a network where knowledge processes are of great importance. These characteristics are[25]:

- Connect people who might not otherwise have the opportunity to interact, either as frequently or at all.
- Provide a shared context for people to communicate and share information, stories, and personal experiences in a way that builds understanding and insight.
- Enable dialogue between people who come together to explore new possibilities, solve challenging problems, and create new, mutually beneficial opportunities.
- Stimulate learning by serving as a vehicle for authentic communication, mentoring, coaching, and self-reflection.
- Capture and diffuse existing knowledge to help people improve their practice by providing a forum to identify solutions to common problems and a process to collect and evaluate best practices.
- Introduce collaborative processes to groups and organisations as well as between organisations to encourage the free flow of ideas and exchange of information.
- Help people organise around purposeful actions that deliver tangible results.
- Generate new knowledge to help people transform their practice to accommodate changes in needs and technologies.

Table 2 comprises the distinct levels and the points of view to look at the 7C model for capacity development. We believe that the issues summarised in the table can help those participating in knowledge arrangements to reflect on, discuss and develop societal success.

[25] Cambridge, D., Kaplan, S., & Suter, V. (2005). *Community of Practice Design Guide. A Step-by-Step Guide for Creating Collaborative Communities of Practice in Higher Education.* Educause.

Connecting the dots

In this essay we have described that the basic processes in the Agri Knowledge System (creation, development, dissemination and utilisation) are no longer a strict linear sequence. Actors within the knowledge system configure arrangements that comprise these processes and their mutual relationships. Instead of a string of beads for the linear sequence we use the image of a bouquet, an arrangement of flowers, to explain what we think is an adequate description of the current situation within and between the subsystems research and education. The issues that knowledge arrangements have to deal with is depicted in the model of figure 1. The diagram shows the interdependencies between items that determine the success of an arrangement. The feedback loops in the model make the situation in which a knowledge arrangement acts of a complex nature. The word complex is used in this essay as is meant in the Cynefin approach. We know from theory that exact outcomes of complex situations are impossible to predict, they emerge. And that small fluctuations in starting conditions can lead to big differences in outcomes. If complex systems are able to adapt to external conditions then we can observe self-organisation. 'Controlling' the outcomes of an arrangement is not possible by making blueprints of actions beforehand. On the contrary, it very much depends on the capacity of all stakeholders involved to act in considerable freedom but adequately. We consider complexity, emergence and self-organisation as characteristics of knowledge arrangements as we have described them in this essay.

A consequence of our view is that there a no best practices that can guide the operation of knowledge arrangements. There are no simple rules to comply to for ascertaining success. Each arrangement has to configure itself to the specific starting situation. There are no simple clues as handholds. In our vision, knowledge arrangements are settlements for mature actors, individuals and organisations, that are able to self-organise their activities and keep track of their shared goals. To our opinion, it implies that most important is the *endogenous capacity development* of all stakeholders in a knowledge arrangement. We once again stress that in this essay the position as not that of an outsider prescribing what to do. After all

a knowledge arrangement is a common responsibility for all actors involved. The elements of the model can act as *lingua franca* for the participants. They point at the aspects that need to be taken into consideration to understand the way to success.

An important implication of the complexity of knowledge arrangements can be found in the field of monitoring and evaluation. M&E can fulfil different functions. For funding stakeholders like governmental organisations evaluation mainly concerns the aspects of accountability and guidance. Accountability needs translation of results into numerical or financial data. For simple situations this can be done quite easily. However for complex situations to produce simple financial figures means pressing reality into an oversimplified mould. The demand for straightforward numerical evidence from funding stakeholders on the one hand and justifying complex reality on the other often produces a tension between different parties in an arrangement.

The different views and approaches we have discussed are not intended to be used as recipes from a cookbook. If appreciated by the reader as appropriate in her or his situation, the reader is invited to collect more information and knowledge about a certain approach. The approaches are not meant to be copied exactly but the utilisation relies on the capacity of people to act adequately for themselves, for their organisations, the network of organisations, and for society at large.

We hope that this essay will contribute to better understand the capacity required for all stakeholders in present configurations for knowledge sharing and creation. So that all participants are convinced that a knowledge arrangement is more than just the sum of its parts.

Colophon

The essay 'Knowledge Arrangements that make a difference' is published by the research programme BO-09, a supportive research programme for knowledge policy of the Ministry of Economic Affairs, Agriculture and Innovation. BO-09 aims at improving knowledge processes in the domains of food and living environment.

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